



Budinger & Associates

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May 18, 2007

Project Number G07123

PROJECT: Liberty View Villas
Liberty Lake, WA

SUBJECT: Formerly Liberty Lakeview Estates -
Geo-hazard Evaluation Preliminary Report

Dear Mr. Main,

We understand that a geological hazard evaluation is required by Spokane County to facilitate residential subdivision and development of the subject property. A previous report dated March 10, 2006, by Budinger and Associates and titled "Geotechnical Report, Evaluation of Drainage and Initial Characterization for Road Cuts, - Liberty Lakeview Estates, Liberty Lake, WA (S06011)" addressed geological features of the site, but the scope of analysis was limited to evaluation of subsurface infiltration potential for use in stormwater management. Since our last report the proposed building plans have changed. This letter is intended supplement to our previous fieldwork at the site and focuses only on possible geological hazards as defined by the Spokane County Critical areas Ordinance. A Vicinity Map and Soil Survey Map are attached to illustrate the site and surrounding area.

Introduction

Spokane County's Critical Areas Ordinance (Spokane County Public Works Department, 1996) requires identification of geologically hazardous areas, principally erosion and landslide hazards (Section 11.20.070). The purpose of the ordinance is to discourage development in geologically hazardous areas unless it can be demonstrated that such areas may be developed consistent with acceptable standards for public health and safety.

Based on this ordinance, erosion and/or landslide hazard areas in Spokane County exhibit at least one of the following characteristics:

- A slope of 30% or greater
- Soils identified by Natural Resource Conservation Service as having a several potential for erosion
- Hydraulic factors such as existing on-site surface and groundwater or changes in hydraulic factors, caused by proposals that create a severe potential for erosion or landslide hazard
- Areas that historically have been prone to landsliding or with one of the following geologic formations: alluvium, landslide deposits, Latah formation
- Areas of uncompacted fill
- Areas that are unstable as a result of rapid stream or stream bank erosion

*Geotechnical & Environmental Engineers
Construction Materials Testing & Inspection*

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Scope of Work

An evaluation of geologic hazards, as specified by the Spokane County Critical Areas Ordinance, was conducted to evaluate feasibility for the proposed development. The scope of work included:

- A review of available geologic and soil information;
- An evaluation of pertinent geologic and hydrologic conditions at the site;
- Field reconnaissance of the subject property;
- Developing professional opinions and recommendations relating to potential geologic hazards as defined by the Critical Areas Ordinance.

This report does not include engineering analysis or design of roadways, utilities, structures or other improvements. Specific geotechnical engineering analysis and mitigation beyond the scope of this study is required by the Critical Areas Ordinance for development and construction in areas with identified geohazards. Evaluation of environmental or permitting issues are also beyond this scope of work but may be provided upon request.

Location and Site Description

The site is located northwest of Liberty Lake, Washington on the west side of Liberty Lake Road, near the intersection of N Liberty Lake Road and Settler Drive. The site occupies approximately 23 acres in the N½, Section 22, T25N, R45E, W.M. as illustrated in the attached Vicinity Map (Figure 1). We understand that 49 residential lots are proposed and that the remainder will be undeveloped at the present time.

Currently there are no permanent structures on the property.

Topographic Characteristics

As stated in our March 2006 report, the ground surface slopes east at 15-50%, with the steepest terrain generally occurring on the eastern half of the site. A majority of the site occupies terrain with slope inclinations of 20% to 40%, as illustrated on the attached Site Map with Slopes. The slopes above the site in the Legacy Hills development are more gradual at approximately 20% or less. Elevations at the site range from 2300 feet in the southwest corner of the property to approximately 2075 feet in the northeast corner of the property. To the south and east are an existing residential development and a city of Liberty Lake water tower. To the east is N Liberty Lake Rd, beyond which is a golf course and housing developments. To the north is a vacant field.

Geologic Setting

Mapped geologic units at the site include the Mount Rathdrum quartz monzonite, which is predominantly made up of Hauser Lake Gneiss (Precambrian) as described in the March 2006 report. The gneiss was formed from very old sandy sediments that have been chemically and physically altered by changes in heat and pressure over that last 540 million years. Illustrated in cross section on the Washington State Department of Natural Resources Geologic Map, Open File Report 2004-12, are carved valleys in the Precambrian rock in-filled with Quaternary sands and gravels, from the ice age floods. In some cases, such as the northeast corner of the property the gravels are much more angular and comprised of shist-like rocks, indicating that they may have traveled a short distance down the hill as an alluvial deposit; however, due to the amount of vegetation and lower slopes in the immediate area, alluvial activity does not appear to be active. Results of soil borings and test pits throughout the site are described in the March 2006 report.

Erosive Soils

The attached Soil Map illustrates the delineations of soil types mapped by the USDA in the vicinity of the project area. The mapped soil types are:

SuE	Spokane extremely rocky complex	20-70% slopes
StE	Spokane very rocky complex	30-70% slopes
StC	Spokane very rocky complex	0-30% slopes

Soil series with severe erosion potential as defined in the Critical Areas Ordinance are in bold

The predominant soil type mapped at the site is *Spokane extremely rocky complex, 20-70%*, with small areas of *Spokane very rocky complex 0-30%* and *Spokane very rocky complex 30-70%*. *Spokane extremely rocky complex, 20-70% slopes* and *Spokane very rocky complex 30-70% slopes* units have been identified to have the potential for a "severe" erosion hazard, by the Critical Areas Ordinance list of erodible soils. Please note that the *Spokane very rocky complex 0-30% slopes* unit is not identified in the Critical areas Ordinance list of erodible soils.

Hydraulic Factors

We did not observe areas impacted by hydraulic factors that would cause a geologic hazard. Previous borings at the site, with field work in February 2006, encountered groundwater between 23 and 26 feet below ground surface.

Landslide Deposits

We encountered glacial flood deposits over bedrock. We did not observe areas of recent alluvium, landslide deposits, or Latah formation.

Areas of Uncompacted Fill

Areas of uncompacted fill were not encountered during the field survey.

Areas of Rapid Stream or Stream Bank Erosion

There is a possibility of seasonal flow in the minor drainages; however, we did not observe any evidence of surface water or current stream bank erosion on site. A creek is located at the base of the slope on the east side of Liberty Lake Road; however, the county road is a boundary between the site and the creek that would tend to prevent toe slope erosion at the property. Surface runoff could be rapid due to the steep slopes and shallow soils; however, development of proper stormwater facilities should address runoff concerns. From our experiences we would also like to note that irrigation, or lawn watering, should also be included into stormwater facilities due to the potential for runoff along steep slopes and shallow soils.

Conclusions

Slopes greater than 30% and erosive soils at the subject property are recognized geologic hazards as defined by the Critical Areas Ordinance. Mitigation should include requirement for geotechnical exploration and analysis as basis for design and construction of site grading, roads, utilities, building lots, and drainage facilities specifically addressing slope stability.

Building roads and foundations on the slopes may involve cutting or blasting. Possible scenarios that may need to be addressed with cut slopes include: creating an over steepened slope, cutting into a spring or shallow groundwater, and properly constructing fill slopes.

Constructing 49 residential units will necessitate a great deal of earthwork and change the current topography and hydrology of the site. If the proposed number of residential units will be built we recommend specific engineering evaluation and mitigation as required by the Critical Areas Ordinance.

Based on the research and reconnaissance described herein, we conclude that hydraulic factors, alluvium, landslide deposits, uncompacted fill, or rapid stream bank erosion are not present on scales large enough to be considered geologic hazards.

Our opinion is that potential geologic hazards associated with erosive soils may be mitigated by implementing effective erosion control measures before, during, and following site disturbance and construction.

Limitations

The conclusions presented herein represent our professional opinions based on the limited scope of work performed to date. It is intended for the sole use of our client for the purposes stated herein and should not be used by other parties for other purposes without contacting us to provide specific evaluation and recommendations. Specific geotechnical evaluation and design for individual lots is beyond the scope of this report.

We attempted to complete these services in a manner consistent with the level of skill and care ordinarily exercised by members of the profession currently practicing in this area with similar budget and time constraints. No express or implied warranties are offered or made.

Be aware that Geohazard Evaluation Preliminary reports do not substitute for geotechnical engineering evaluations to design slopes, walls, roads, utilities, structures, and earthwork. We recommend conducting appropriate geotechnical engineering studies during design of your project.

Please contact us if you have questions or concerns regarding the information presented herein. Our staff of engineers, geologists, and engineering technicians is available to perform geotechnical engineering, quality control, and materials testing during construction to help you complete a quality project.

Respectfully Submitted:
BUDINGER & ASSOCIATES, INC.

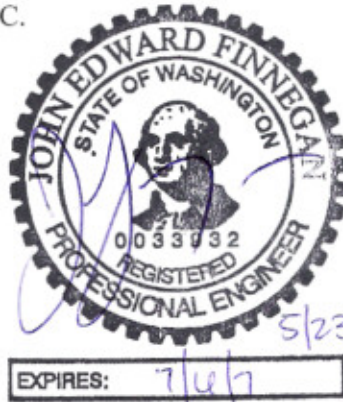
Chad Pritchard
Staff Geologist

SDB/cjp

Addressee - 3

Attachments:

- Vicinity Map, Figure 1
- Site Plan, Figure 2
- USDA Web Soil Survey Map, Figure 3

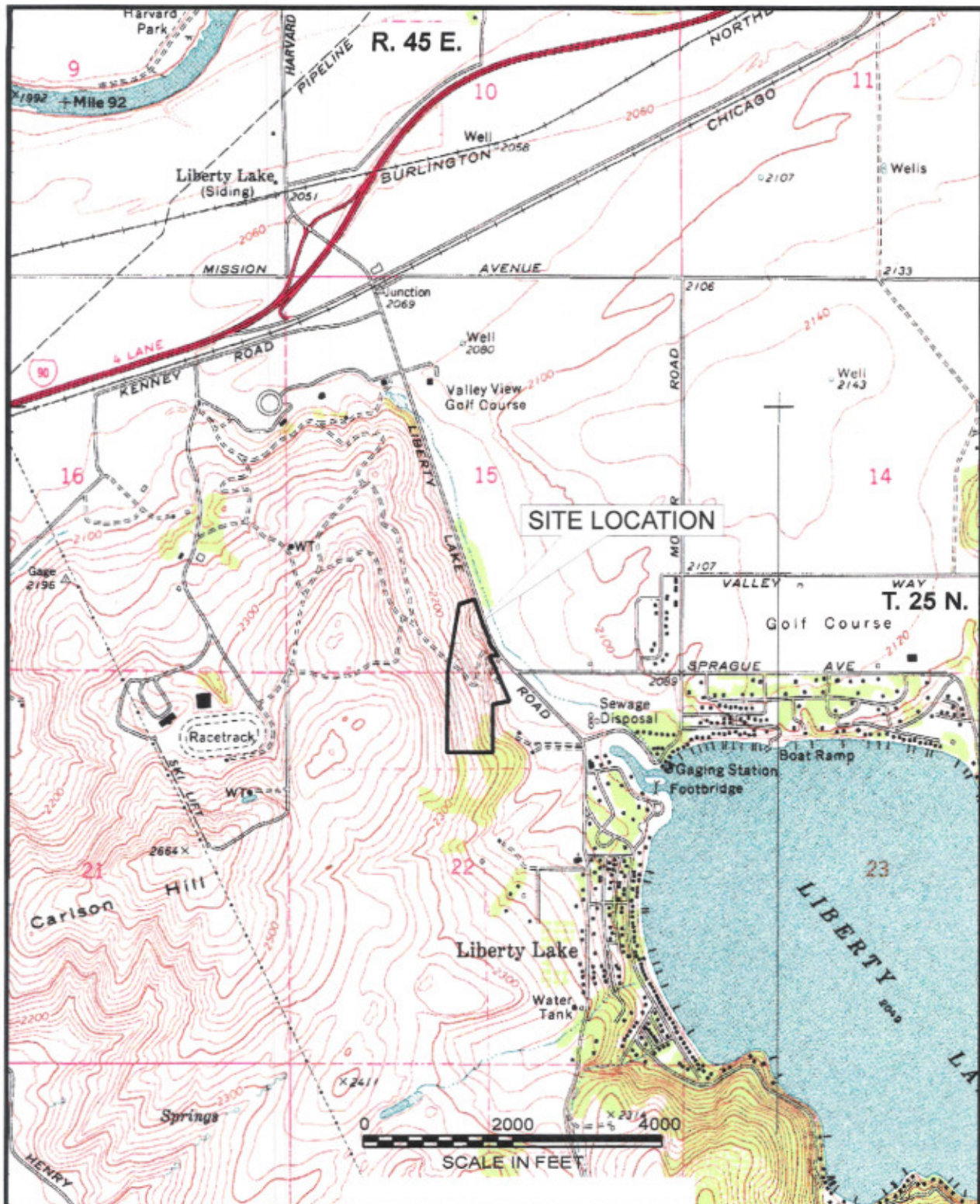




John E. Finnegan, PE, LHG
Geotechnical Engineer

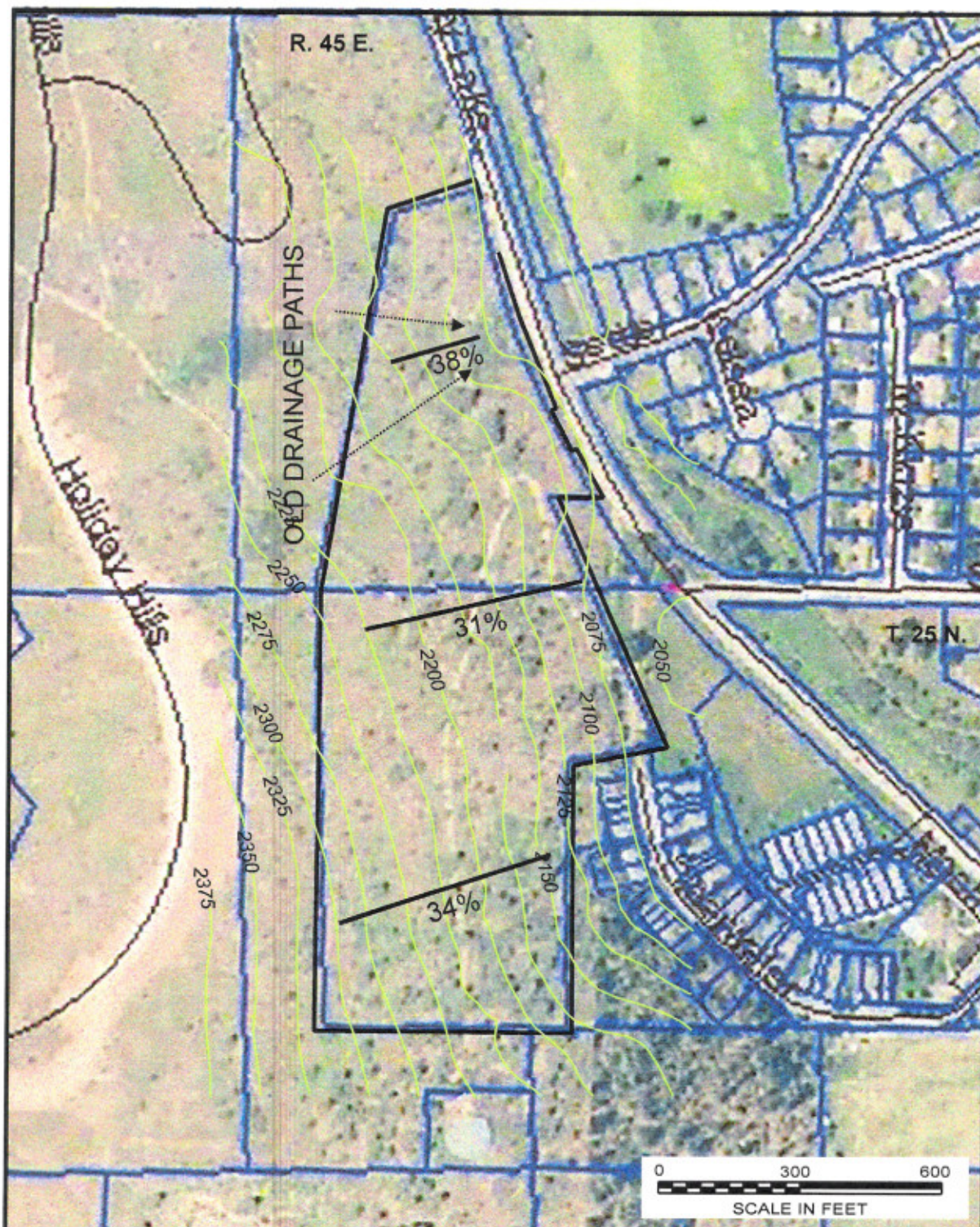
References:



Derkey, R.E.; Hamilton, M.M.; and Stradling, D.F.: Geologic Map of the Washington portions of the Liberty Lake 7.5 minute quadrangle and the south half of the Newman Lake 7.5 minute quadrangle, Spokane County, 1:24000, OFR 2004-12.

Source: Soil types are mapped by the USDA-NRCS Soil Survey, on the Web Soil Survey 1.1 (<http://websoilsurvey.nrcs.usda.gov/app/>) (attached).



 G07123_VIC.cdr	 Budinger & Associates	<p>VICINITY MAP</p> <p>LIBERTY VIEW VILLAS</p> <p>LIBERTY LAKE, WASHINGTON</p>	<p>JOB # H07123</p> <p>DATE : 5/10/07</p> <p>FIGURE 1.</p>
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 X08012_SITE.cdr	 Budinger & Associates	SITE MAP WITH SLOPES	JOB # H07123
		LIBERTY VIEW VILLAS LIBERTY LAKE, WASHINGTON	DATE : 5/10/07
			FIGURE 2.

[illegible]

SOIL SURVEY OF SPOKANE COUNTY, WASHINGTON

MAP LEGEND

	Soil Map Units
	Cities
	Detailed Counties
	Detailed States
	Interstate Highways
	Roads
	Rails
	Water
	Hydrography
	Oceans
	Escarpment, bedrock
	Escarpment, non-bedrock
	Gulley
	Levee
	Slope
	Blowout
	Borrow Pit
	Clay Spot
	Depression, closed
	Eroded Spot
	Gravel Pit
	Gravelly Spot
	Gulley
	Lava Flow
	Landfill
	Marsh or Swamp
	Miscellaneous Water
	Rock Outcrop
	Saline Spot
	Sandy Spot
	Slide or Slip
	Sinkhole
	Sodic Spot
	Spoil Area
	Stony Spot
	Very Stony Spot
	Perennial Water
	Wet Spot

MAP INFORMATION

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>

Coordinate System: UTM Zone 11

Soil Survey Area: Spokane County, Washington
Spatial Version of Data: 1
Soil Map Compilation Scale: 1:20000

Map comprised of aerial images photographed on these dates:
5/22/1992

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend Summary

Spokane County, Washington

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BsB	Bong and phoebe loamy sands, 0 to 20 percent slopes	0.0	0.0
StC	Spokane very rocky complex, 0 to 30 percent slopes	0.9	3.7
StE	Spokane very rocky complex, 30 to 70 percent slopes	0.2	1.0
SuE	Spokane extremely rocky complex, 20 to 70 percent slope s	23.2	95.3